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Earth Systems Lesson Plan: Size and Forces of the Solar System

Getaway Special Team 2010

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Lesson Plan – Earth Systems

Unit Theme: Solar System

Subject Area: Science

Lesson Title: Size and Forces of the Solar System

Number of Learners: Entire class

Grade Level: 9th

Time Needed: 30-45 minutes

Curriculum

Standard 1: Students will understand the scientific evidence that supports theories that explain how the universe and solar system developed.

Objective 2: Relate the structure and composition of the solar system to the processes that exist in the universe.

f. Relate the structure of the solar system to the forces acting upon it.

Materials Needed

- Softball (Representing the Sun)
- 2 Practice Golf Balls (Jupiter and Saturn)
- 2 Peanuts (Venus and Earth)
- Q-tip Head (Mars)
- 2 – ¼” long round noodles (Uranus and Neptune)
- Oatmeal (Mercury)
- Salt (Pluto)
- Tape Measure or Yardstick

Learning Objectives

Understand the structure and dimensions of the solar system along with the forces that hold the solar system together.

Background Knowledge

Understand the organization of the solar system and basic characteristics of the planets.

Understand that gravity holds the universe together and its impact on daily Earth life.

Understand that microgravity is the lack of gravity, or falling at the same speed as gravity (9.8m/s^2).

Instructional Procedure

Introduce the team and the topic for the day. Ask the students what they know about the composition of the solar system. What planets compose the solar system? Ask them if they know the sizes of the objects (e.g., which is the biggest, smallest, hottest, etc.) Tell them that we are going to make a scale model of the solar system in their classroom. Show the students the objects and ask them which one represents the sun. Have a student come up and hold each object and represent that designated planet. Go through and ask them which objects would represent the remaining planets. Once all the objects are chosen, assign the students to space themselves out in the following order to give a relative picture of the vastness of the solar system. Starting with the Sun at the front of the classroom, space the students the following dimensions away:

Sun (Softball) = 0 in

Mercury (Oatmeal) = 4.5 in

Venus (Peanut) = 8.3 in
Earth (Peanut) = 12 in
Mars (Q-tip Head) = 18 in
Jupiter (Practice Golf Ball) = 5 ft
Saturn (Practice Golf Ball) = 9.8 ft
Uranus (1/4" long round noodle) = 16.4 ft
Neptune (1/4" long round noodle) = 24.6 ft
Pluto (Salt) = 32.8 ft

*Note the objects are not to scale with the model, just visual representations. Based off dimensions taken from the following solar system classroom model website:

[http://rip.physics.unk.edu/Astronomy/PlanetDistance\(2-8\).html](http://rip.physics.unk.edu/Astronomy/PlanetDistance(2-8).html)

Ask the students what holds them all together even though they are so far apart. Discuss with the students the force of gravity and how it holds the universe together. Ask them what would happen to the planets without any gravity acting on them. Thank the students for helping, have them return the planet items, and return to their seats.

Next discuss with the students how impact gravity has on Earth. Discuss what happens when you boil water. Where do the bubbles go? If there is no gravity ask them what would happen to boiling bubbles? Discuss with the students that the GAS team was wondering the same thing and wanted to know if it could one day have a use in space. Show the students the model of the boiling cube and briefly explain how it works. Next show the videos of boiling on earth and in microgravity. Be sure to point out the direction the bubbles go.

Boiling on Earth:

<http://www.youtube.com/watch?v=Z-N1j-8tR3s>

Boiling in Microgravity:

<http://www.youtube.com/watch?v=h9PnK58m0tE>

Talk about the research performed, what we have learned, and what we continue to hope to learn. Show the students the NASA team video.

<http://www.youtube.com/watch?v=7xQp8LWcqoE>

Wrap up with a few experiences from the trip and promote college and the opportunities you can have. Go Aggies! End with questions.

Assessment

Students correctly place the planets and have an understanding of their size and distance relative to the Sun.

Extensions

Websites great for correct dimensions of the objects depending on beginning size of the Sun.

<http://thinkzone.wlonk.com/Space/SolarSystemModel.htm>

http://www.exploratorium.edu/ronh/solar_system/